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动物分类学报

# 中国真缓步纲熊虫一新种及四新纪录种记述(离爪目,小斑熊虫科,近爪目,大生熊虫科,高生熊虫科)

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**摘 要** 记述了采自中国安徽省黄山、内蒙古自治区扎兰屯市、黑龙江省五大连池市、西藏自治区米林县和海南省三亚市的减化小斑熊虫 *Milnesium reductum* Tumanov, 2006 中国新纪录种;采自黑龙江省五大连池市、伊春市和内蒙古自治区根河市的小隙大生熊虫 *Macrobiotus areolatus* J. Murr., 1907 中国新纪录种;采自安徽省黄山,黑龙江省五大连池市和伊春市,山东省曲阜市的懒惰大生熊虫 *Macrobiotus arguei* Pilato et al., 1975 中国新纪录种;采自安徽省黄山的具斑双相熊虫 *Diphascon* (*Adropion*) *punctatum* (Iharos, 1962) 中国新纪录种;采自中国西藏自治区当雄县的等高熊虫属标本因大的外爪不在底部分叉,有尖锥形的共同基部,较小的内爪在底部分叉,初级分枝与次级分枝顶部均成钩状弯曲而与该属中已知其它种均不相同,定名为当雄等高熊虫新种 *Isohypsibius damxungensis* sp. nov.。所有的标本均保存于中国科学院水生生物研究所。

**关键词** 真缓步纲,熊虫,中国新纪录种,新种,西藏自治区当雄县.
**中图分类号** Q959.16

作者于 2005 年 6 月和 2006 年 5 月分别在安徽省黄山和山东省曲阜市孔林采集了数号苔藓样品。在 2006 年,特请中国科学院水生生物研究所魏印心教授和上海师范大学王全喜教授分别在海南省三亚市、内蒙古自治区扎兰屯市和根河市以及黑龙江省五大连池市和伊春市采集了数号苔藓样品,又请中国科学院水生生物研究所博士研究生陈锋在西藏自治区米林县 (29°13′N; 94°13′E; 海拔2 997 m) 的老柳树上和当雄县 (30°27′N; 91°10′E; 海拔4 060 m) 采集了数号苔藓、地衣和朽木样品。对以上这些地区缓步动物的了解相当缺乏 (Kaczmarek et al., 2002; Beasley et al., 2006)。作者在本所实验室内用沉淀法将熊虫从苔藓、地衣和朽木等样品中分离出来并在解剖镜和显微镜下观察、测量和绘图,共发现真缓步纲 4 个中国新纪录种和 1 个新种。分别记述如下。

**材料和方法** 从野外带回的纸袋包装苔藓、地衣和朽木样品经用沉淀法和 40 目的分样筛分离出熊虫来,在 30 倍或更大倍数的解剖镜下逐个找出沉渣中的熊虫。经用 2 %的醋酸处理过后,熊虫可以得到充分伸展,经水洗并放入 10 %的福尔马林中 24 小时即可做永久性封固。用 Hoyer 氏封片介质将熊虫封固在载玻片上,其配方为: 50 ml 水; 30 gm 中性树脂; 200 gm 水合三氯乙醛; 20 ml 甘油。在显微镜下先用低倍物镜头找到虫体,再转换到高倍物镜头下作详细观察,放大 600 ×700 倍能鉴定到种,再用目镜侧微尺测量虫体及其部分的长度和宽度。

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**真缓步纲** Eutardigrada Marcus, 1927
**离爪目** Apochela Schuster et al., 1980
**小斑熊虫科** Milnesiidae Ramazzotti, 1962
**小斑熊虫属** *Milnesium* Doyère, 1840

**减化小斑熊虫** *Milnesium reductum* Tumanov, **2006** 中国新纪录 (图 1～3)

**体长** 302.5 ～ 532.4 μm, **最大体宽** 133.1 ～ 213.4 μm。身体浅褐色,头部有 1 对大眼,体表角皮上布满"珠状"刻纹。口管粗短,梨形咽球没有板。双爪的初级分枝与次级分枝完全分开,次级分枝粗而相对较长,具有变粗的圆形基部,顶部 2 个较长的附属尖头弯曲着伸向同一侧面。在所有腿上内爪的次级分枝上均有 1 个粗而尖的基距,外爪的次级分枝上没有这个基距 (Tumanov, 2006)。标本得自安徽省黄山,内蒙古自治区扎兰屯市,黑龙江省五大连池市,贵州省贵阳市花溪公园和黔灵公园,西藏自治区米林县的苔藓中以及海南省三亚市亚龙湾树干底部树皮碎屑里。

**近爪目** Parachela Schuster, 1980
**大生熊虫科** Macrobiotidae Thulin, 1928
**大生熊虫属** *Macrobiotus* Schultze, 1834

**小隙大生熊虫** *Macrobiotus areolatus* J. Murr., **1907** 中国新纪录 (图 4～7)

**体长** 350.2 ～ 701.8 μm, **最大体宽** 193.6 ～

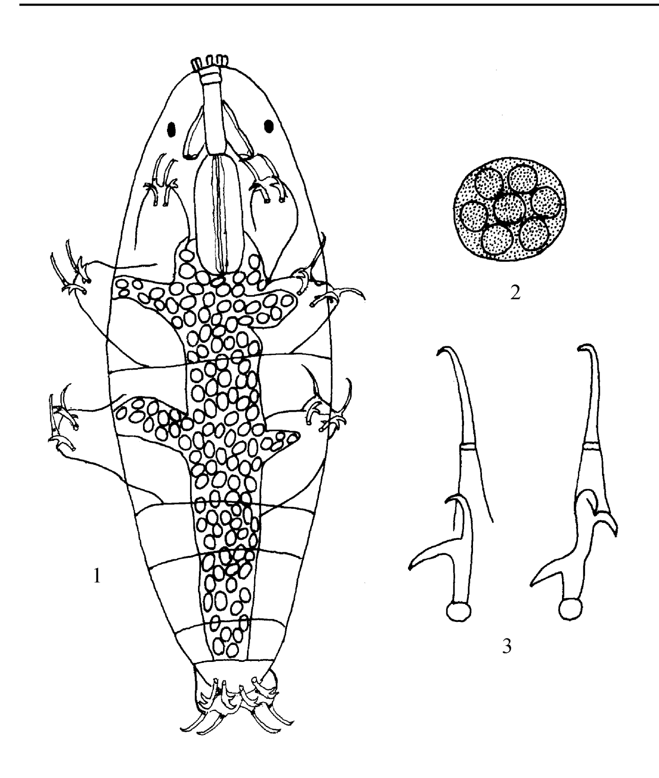



图 1～3 减化小斑熊虫 Milnesium reductum Tumanov, 2006
1. 整体背面观 (dorsal view of the whole body) 2. 卵囊 (eggs pocket) 3. 第 3～4 对腿的双爪 (double claws of the third and 4th pairs of legs)

249.3μm。体表角皮上布满大、小两种"珠状"刻纹, 后者稀疏, 头部没有眼。咽球内有表皮突和 3 个末端呈节结状的杆状大板, 通常第 3 大板最长, 第 2 大板最短, 小板极小 (Horning and Schuster et al., 1978)。粗状的双爪呈 Y 字形分叉, 初级分枝顶部有两个粗大的附属尖头, 初级分枝与次级分枝交界处有一明显的角皮条, 爪基有一圆形的小角皮和较小的外缘常加厚的小月面。卵壳突起是圆锥形的, 突起之间的卵壳是不规则的多角形小区 (Ramazzotti & Maucci, 1983)。标本得自黑龙江省五大连池市、伊春市和内蒙古自治区根河市的苔藓中。本种世界性分布, 亚洲的日本、北朝鲜和蒙古国也有发现。

**懒惰大生熊虫** Macrobiotus arguei Pilato & Sperlinga, **1975** 中国新纪录 (图 8～11)

**体长** 266.2～484.0μm, **最大体宽** 95.2～133.2μm。身体无色透明, 体表角皮上布满"珠状"刻纹, 头部有小眼。口管相当粗短, 咽球圆形, 内有表皮突、3 个卵圆形的大板和 1 个尖锥形的小板, 其中第 1 大板最粗大, 第 2 大板最小, 第 3 大板细长。双爪粗壮, 呈 Y 字形分叉, 初级分枝顶部有大的附属尖头, 近爪基有呈扁圆形的小月面。卵壳上有 10 个以上表面有相同网孔图案的圆锥形突起 (Ramazzotti & Maucci, 1983)。标本得自安徽省黄山海拔 1 000 m 左右的岩石上、内蒙古自治区扎兰屯市, 黑龙江省五大连池市和伊春市五营的苔藓中以及山东省曲阜市孔林的干树皮中。

**高生熊虫科** Hypsibiidae Pilato, 1969
**双相熊虫属** Diphascon Plate, 1889

**具斑双相熊虫** Diphascon (Adropion) punctatum (Iharos, **1962**) 中国新纪录 (图 12～14)

**体长** 298.4μm, **最大体宽** 96.8μm。身体黄色, 头部没有眼, 背面和腿的角皮上被一种细而密的颗粒覆盖着, 细粒的大小大约相同而且多少无规则地排列着。口管和咽管狭细, 咽球是非常延伸的椭圆形体, 几乎与口管等长, 内有前短后长的两个杆状大板, 第 2 大板为第 1 大板的 3 倍长, 没有小板。每腿两双爪大小不同, 在基部分叉, 两个初级分枝顶部呈钩状猛烈弯曲并且有两个附属尖头 (Iharos, 1962)。标本得自安徽省黄山海拔 1 500 m 处岩石上的苔藓中。模式标本采自匈牙利南部山区。

**等高熊虫属** Isohypsibius Thulin, **1928**

**当雄等高熊虫, 新种** Isohypsibius damxungensis sp. nov. (图 15～18)

**鉴征** 个体较大, 全身浅黄色, 头部有 1 对圆形的黑色眼点。体表角皮上散布着大小不等的长方形或者圆形刻纹。口管细而短, 咽球甚大呈圆球形, 内有小的角状表皮突和 3 个大板, 没有小板。前面两个卵圆形的大板相距很近, 其长度之合与后面第 3 个长椭圆形大板的长度相等。大的外爪不在底部分叉, 有呈尖锥形共同的基部, 较小的内爪在基部分叉, 初级分枝与次级分枝顶部均成钩状弯曲。

**形态** 个体粗大, 呈椭圆形, 体长 324.3～399.3μm, 最大体宽 101.6～145.2μm。全身浅黄色, 头部有 1 对圆形的黑色眼点。体表角皮上散布着大小不等的长方形或者圆形刻纹。口的周围有 6 块唇状表皮突, 口管细而短, 僵硬, 没有螺旋增厚并深深地插入咽球内。咽球甚大呈圆球形, 内有小的角状表皮突和 3 个大板, 没有小板。前面两个卵圆形的大板相距很近, 其长度之合与后面第 3 个长椭圆形大板的长度相等, 从口管末端向后伸出一纵隔。每腿末端两个双爪的形状和大小不同, 也不对称, 爪序为 2, 1, 2, 1。大的外爪不在基部而呈"Y"字形分叉, 共同的基部呈尖锥形, 靠近基部有 1 条形的小月面, 小的内爪呈 V 字形在基部分叉。细长的初级分枝与粗短的次初级分枝连接处有大的圆形角皮并且有柔软的关节使其容易弯曲。初级分枝与次级分枝上均有细长的角皮条, 顶部均成钩状弯曲

而且都没有附属尖头。

正模标本，5 副模标本得自中国西藏自治区当雄县（Damxung Xian）（30°27′N，91°10′E；海拔 4 060 m）的地衣和朽木中。

讨论 由于每腿两个双爪的大小和形状不同，也不对称，外爪的初级分枝与次初级分枝连接处有柔软的关节而且容易弯曲，故可以肯定是等高熊虫属 Isohypsibius 的种类，而不是高生熊虫属 Hypsibius 的种类。全世界已发现等高熊虫属 120 余种，中国也已发现 14 种，其中 6 种是由中国学者近年发现的。就咽球内 3 个大板的大小比例以及没有小板来看，西藏当雄标本与 Isohypsibius baldii（Ramazzotti，1954）和 Isohypsibius granulifer Thulin，1928 两种颇为相似，但是它们腿的末端两个双爪明显不同。Isohypsibius baldii 的双爪呈 V 字形在底部分叉，初级分枝顶部均有附属尖头。Isohypsibius granulifer 第 1 对腿的末端两个双爪在底部分叉，第 4 对腿的两个双爪均不在底部分叉。西藏当雄标本大的外爪不在底部分叉，有呈尖锥形共同的基部，较小的内爪在基部分叉。初级分枝与次级分枝上均有细长的角皮条，顶部均成钩状弯曲而且都没有附属尖头。因此它们应为不同的种，而且与本属中已知的其它种也不相同，可以确定为一新种。

词源：新种以采集地中国西藏自治区的地当雄县而命名。

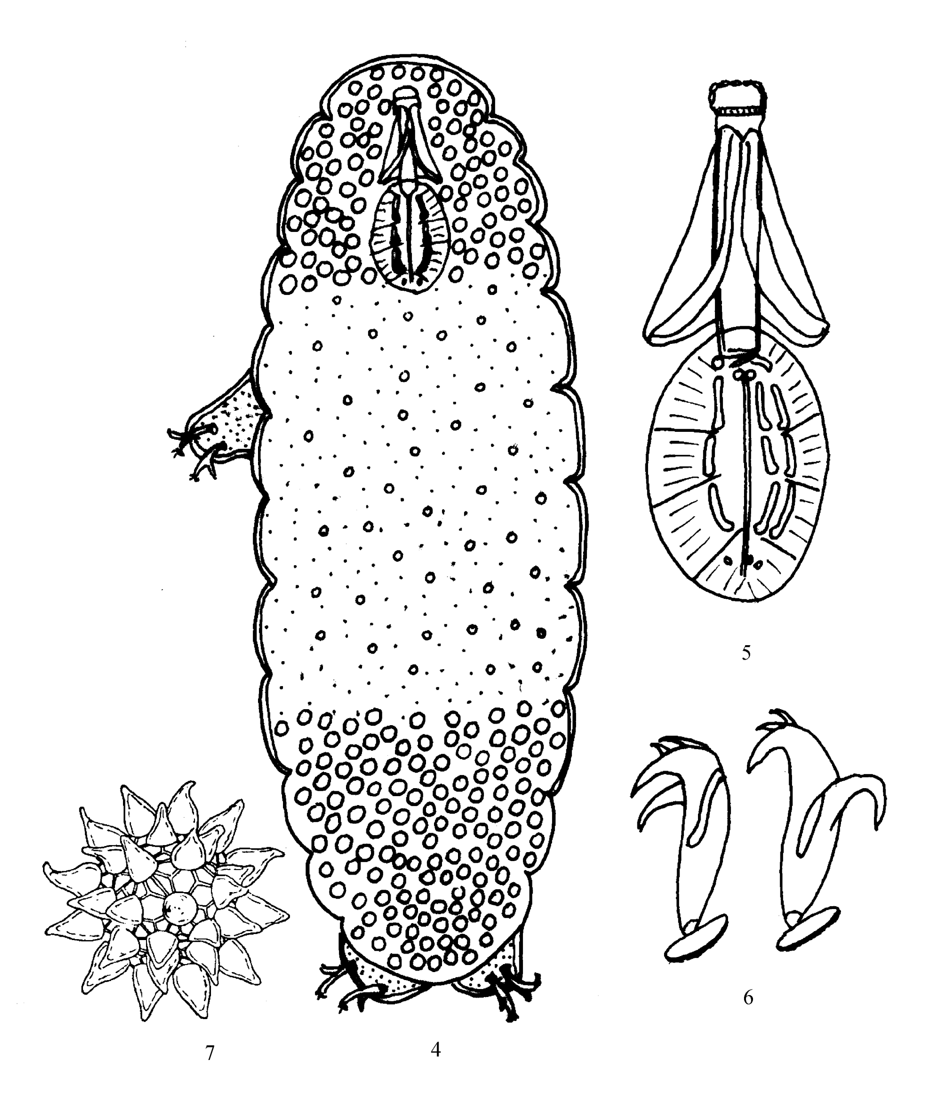



图 4～7 小隙大生熊虫 Macrobiotus areolatus J. Murr.，1907
4. 整体背面观（dorsal view of the whole body） 5. 口管和咽球（buccal tube and pharynx ball） 6. 第 4 对腿的双爪（double claws of the 4th pair of legs） 7. 卵壳上的装饰物（ornaments on the egg shell）（4～6. 作者图，7. 自 Ramazzotti & Maucci，1983）

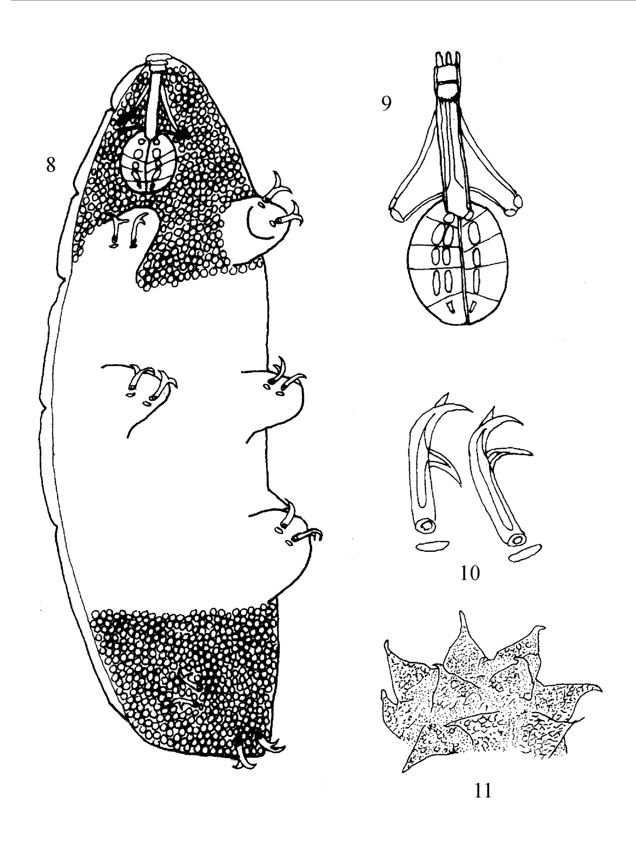



图 8～11 懒惰大生熊虫 Macrobiotus arguei Pilato & Sperlinga, 1975
8. 整体腹面观 (ventral view of the whole body) 9. 口管和咽球 (buccal tube and pharynx ball) 10. 第 4 对腿的双爪 (double claws of the 4th pair of legs) 11. 卵壳上的装饰物 (ornaments on the egg shell) (8～10. 作者图, 11. 自 Pilato & Sperlinga, 1975)

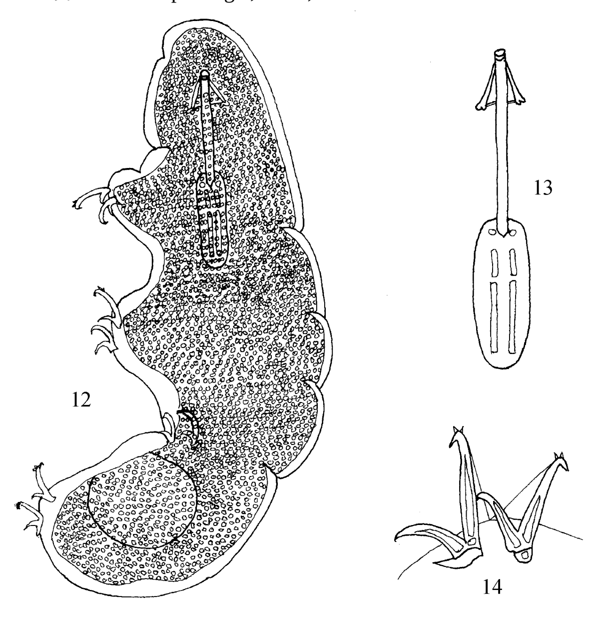



图 12～14 具斑双相熊虫 Diphascon (Adropion) punctatum (Iharos, 1962)
12. 整体背面观 (dorsal view of the whole body) 13. 口管和咽球 (buccal tube and pharynx ball) 14. 第 4 对腿的双爪 (double claws of the 4th pair of legs)

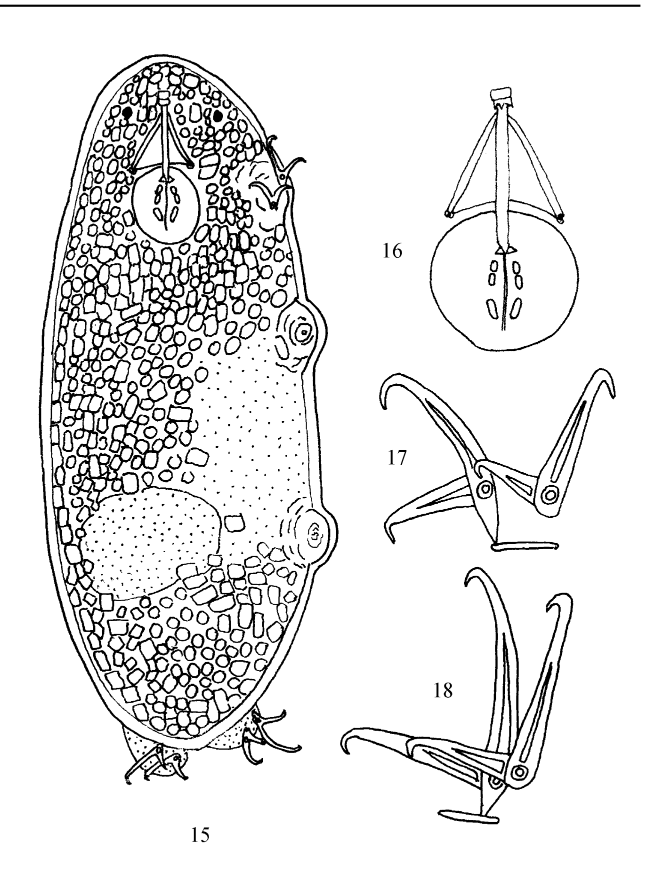



图 15～18 当雄等高熊虫, 新种 Isohypsibius damxungensis sp. nov.
15. 整体背面观 (dorsal view of the whole body) 16. 口管和咽球 (buccal tube and pharynx ball) 17. 第 2 对腿的双爪 (double claws of the second pair of legs) 18. 第 4 对腿的双爪 (double claws of the 4th pair of legs)

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Yang, T 2007. Tardigrades from some mosses of Shennong Frame State Forest Park in China. Acta Zootax. Sinica, 32 (1): 186-189. [动物分类学报]

# ONE NEW SPECIES AND FOUR NEWLY RECORDED SPECIES OF THE CLASS EUTARDIGRADA FROM CHINA (APOCHELA, MILNESIIDAE, PARACHELA; MACROBIOTIDAE, HYPSIBIIDAE)

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**Abstract** In June of 2005 and in May of 2006, the writer has collected some paper bags of mosses and dry barks from Huangshan (alt. 1 200-1 500 m) of Anhui Province and Qufu City (Konglin) of Shandong Province. During 2006, some paper bags of mosses and powdery remnant of wood were collected by Ms. WEI Yin-Xin of Institute of Hydrobiology, Chinese Academy of Sciences and Dr. WANG Quan-Xi of Shanghai Normal University from Sanya City of Hainan Province, Zalantun City and Genhe City of Inner Mongolia Autonomous Region and Wudalianchi City and Yichun City of Heilongjiang Province. Some paper bags of mosses, lichens and punks were collected by a graduate student Mr. Chen Feng from Milin County (29°13′N; 94°13′E; alt. 2 997 m) and Damxung County (30°27′N; 91°10′E; alt. 4 060 m) of Tibet Autonomous Region. Our knowledge of Tardigrada from these areas was rather meager. Using precipitation method, the writer have gotten more tardigrade specimens from these mosses, powdery remnant of wood, lichens and punks, including one new species and four newly recorded species for China. Simple descriptions of these species are given below.

Class Eutardigrada Marcus, 1927
Order Apochela Schuster et al., 1980
Family Milnesiidae Ramazzotti, 1962

Genus Milnesium Doyère, **1840**

*Milnesium reductum* Tumanov, 2006 were found in Huangshan of Anhui Province, Zalantun City of Inner Mongolia Autonomous Region, Wudalianchi City of Heilongjiang Province, Milin County of Tibet Autonomous Region and Sanya City of Hainan Province (Figs. 1-3). Body length 301.5-532.4 μm, maximum width 133.1-213.4 μm. Head with a pair of large eyes. Primary branch and secondary branch are separated completedly. Secondary branch of inner claw with basal spur and the secondary branch of outer claw without basal spur.

Order Parachela Schuster, 1980
Family Macrobiotidae Thulin, 1928

Genus Macrobiotus Schultze, **1834**

*Macrobiotu areolatus* J. Murr., 1907 were found in Wudalienchi City and Yichun City of Heilongjiang Province and Genhe City of Inner Mongolia Autonomous Region (Figs. 4-7). Body length 350.2-701.8 μm, maximum width 193.6-249.3 μm. Head without eye. Pharyngal ball with apophyses and three macroplacoids of rod shap, usually the third is longer and the second shorter, distances of macroplacoids expanding. Double claws with medium size and smooth lunulae. Conical projections of egg taper to points. *Macrobiotu arguei* Pilato & Sperlinga, 1975 were found in Huangshan of Anhui Province, Wudalianchi City and Yichun City of Heilongjiang Province, Qufu City (Konglin) of Shandong Province (Figs. 8-11). Body length 266.2-489.0 μm, maximum width 95.62-133.2 μm. Head with small eyes. Pharyngal ball with apophyses, three round macroplacoids and a rather large microplacoid. Double claw present Y fork, with accessory points and lunulae. Egg with conical projections.

Hypsibiidae Pilato, 1969

Diphascon Plate, **1889**

*Diphascon (Adropion) punctatum* (Iharos, 1962) were found in Huangshan of Anhui Province (Figs. 12-14). Body length 298.4 μm, maximum width 96.8 μm, only one specimen. Head without eye. Buccal and pharyngal tube narrow and long, pharyngal ball is very elongated oval and containing two rod macroplacoids, the second equal to three muptiples length of the first, without microplacoid. Two double claws have different size, primary branches strong bent in a hook at the distal end.

Isohypsibius Thulin, **1928**

*Isohypsibius damxungensis* sp. nov. were found in Damxung County of Tibet Autonomous Region (Figs. 15-18). Body length 324.3-399.3 μm, maximum

width 101.6-145.2 μm. Head with round eyes, rectangular or round sculptures of different size on the dorsal cuticle. Buccal tube narrow and short, pharyngal ball with apophyses and three macroplacoids and without microplacoid. The third length equal to the first two touched together. Two double claws have different size and shapes, outer claw with pointed base and strip lanulae, inner claw present V fork. All branches strongly bent in a hook at the distal end and with accessory points.

So far as I know about 120 species of this genus have been described in the world. Damshune species differ from all known similar species in outer claws and inner claws. Therefore I consider them new to science. All the specimens are deposited in the Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan.

Etymology. *Isohypsibius damxungensis* sp. nov. is named in a souvenir for discovery place of Tibet Autonomous Region, China.

Key words Eutardigrada, tardigrade, newly recorded species for China, new species, Damxung County of Tibet Autonomous Region.